CLAIMS

1. A protein involved in the virulence of Leishmania, comprising at least one site (Cys-Gly-His-Cys) identical to the potential active site of a protein from the protein disulfide-isomerase family (PDI).

2. A Leishmania protein involved in the virulence of the parasite, comprising at least one site (Cys-Gly-His-Cys) identical to the potential active site of a protein from the protein disulfide-isomerase family (PDI).

3. A protein according to claim 1 or claim 2, characterized in that it is the LmPDI protein of Leishmania major, with sequence SEQ ID No: 2, or any functional variant of LmPDI having at least 40% identity, preferably at least 80% identity with LmPDI.

4. A recombinant polypeptide comprising at least one fragment of more than 10 amino acids of a protein according to any one of claims 1 to 3, said recombinant polypeptide being capable of triggering an immunological reaction against an epitope of LmPDI when administered to a human or animal host.

5. A recombinant polypeptide according to claim 4, characterized in that it is the LmPDI-$(His)_6$ protein with sequence SEQ ID No: 3.

6. A fusion protein comprising a recombinant polypeptide according to claim 4, fused with a further polypeptide fragment, said fusion protein being capable of triggering an immunological reaction against an LmPDI epitope when it is administered to a human or animal host.

7. A recombinant nucleic acid sequence coding for a protein or a polypeptide according to any one of claims 1 to 6.

8. A nucleic acid sequence according to claim 7, characterized in that it comprises the coding sequence corresponding to nucleotides 241 to 1674 of sequence SEQ ID No: 1, or a fragment of said sequence 100 nucleotides or more in size.

9. A nucleic acid vector, characterized in that it comprises a nucleic acid sequence according to claim 7 or claim 8.

10. A vector according to claim 9, characterized in that it is a plasmid, a cosmid, a phage or a virus.

11. A cultured cell comprising a vector according to claim 9 or claim 10.

12. A cell according to claim 11, characterized in that it is bacterial strain LmPDI-XL_1 deposited at the Collection Nationale de Culture des Microorganismes [CNCM, the National Collection of Microorganism Cultures], on 31/01/2002 with accession number I-2621.

13. Use of a nucleic acid probe specifically hybridizing under highly stringent conditions with the nucleic acid sequence of SEQ ID No: 2, to determine the presence or absence of the virulence gene coding for LmPDI in a biological sample.

14. A nucleotide primer, characterized in that it allows specific amplification of at least a portion of the sequence of SEQ ID No: 1, from cells infected with Leishmania, thus allowing the presence or absence of the virulence gene coding LmPDI to be determined in a biological sample.

15. A purified antibody, specifically recognizing LmPDI.

16. An immunogenic composition comprising a protein according to claim 1, 2, 3 or 6 and/or a recombinant polypeptide according to claim 4 or claim 5, and/or a nucleic acid sequence according to claim 7 or claim 8, and/or a vector according to claim 9 or claim 10, and/or a cell according to claim 11, said immunogenic composition being capable of in vitro stimulation of the proliferation of mononuclear cells originating from individuals who have come into contact with a Leishmania parasite.

17. An immunogenic composition according to claim 16, capable of in vitro stimulation of the proliferation of mononuclear cells originating from individuals who have come into contact with Leishmania major.

18. An immunogenic composition according to claim 16 or claim 17, having a pharmaceutically acceptable formulation for administration to a human or animal host.

19. An immunogenic composition according to claims 16 to 18, capable of inducing an immune response of the Th1 type when administered to a human or animal host.

20. A vaccinating composition comprising a protein according to claim 1, 2, 3 or 6 and/or a recombinant polypeptide according to claim 4 or claim 5, and/or a nucleic acid sequence according to claim 7 or claim 8, and/or a vector according to claim 9 or claim 10, and/or a cell according to claim 11, said vaccinating composition being intended to protect a human or animal host against leishmaniasis.

21. A vaccinating composition according to claim 20, having a pharmaceutically acceptable formulation for administration to a human or animal host.

22. An immunogenic and/or vaccinating composition according to any one of claims 16 to 21, further comprising an antigen foreign to Leishmania and/or a nucleic acid sequence coding for an antigen foreign to Leishmania.

23. A method for screening molecules that are susceptible of inhibiting the growth of Leishmania major, comprising a step for evaluating the capacity of said molecules to inhibit the activity of LmPDI.

24. A screening method according to claim 23, in which the step for evaluating the capacity of a molecule to inhibit the activity of LmPDI is carried out in a test for reactivating scrambled RNase A comprising the following steps:

- incubating scrambled RNase A in the presence of LmPDI under conditions allowing its reactivation;
- incubating scrambled RNase A under conditions identical to those allowing its reactivation by LmPDI, the molecule to be tested being added;

- comparing the results obtained in the absence and in the presence of the test molecule, a fault in the reactivation of RNase A in the presence of the test molecule revealing that said molecule has an LmPDI inhibiting activity.

25. A screening method according to claim 23 or claim 24, further comprising a test for inhibiting the growth of Leishmania major in a liquid medium and if appropriate a test for inhibiting the growth of Leishmania major in an experimental murine model of leishmaniasis.

26. Use of one or more protein disulfide-isomerase (PDI) inhibitors, for the preparation of a pharmaceutical composition intended for prophylaxis, attenuation or treatment of infection with Leishmania.

27. Use according to claim 26, in which a PDI inhibitor is an anti-PDI or anti-LmPDI antibody, bacitracin, zinc bacitracin, 5,5'-dithiobis(2-nitrobenzoic) acid (DTNB), p-chloromercuribenzene sulfonic acid (pCMBS) or tocinoic acid.

28. Use according to claim 26 or claim 27, for the preparation of a composition for topical, oral or parenteral administration to a human or animal host.

29. Use of bacitracin or zinc bacitracin as an inhibitor of the growth of a parasite responsible for leishmaniasis or as an active agent against a leishmaniasis infection.

30. A pharmaceutical composition intended for the treatment of a leishmaniasis infection, comprising an antibody according to claim 15.

31. A composition according to claim 30, suitable for topical, oral or parenteral administration.

32. A pharmaceutical composition intended for the treatment of an infection with Leishmania, containing one or more protein disulfide-isomerase (PDI) inhibitors.

33. A pharmaceutical composition according to claim 32, containing bacitracin or zinc bacitracin.

34. An in vitro method for diagnosing an infection by a parasite responsible for leishmaniasis, characterized in that it comprises:

- bringing at least one antibody according to claim 15 into contact with a biological sample from a subject partially infected with a parasite responsible for leishmaniasis under conditions allowing the formation of an immune complex between said antibody and antigenic proteins contained in the sample;
- detecting said complex.

35. A diagnostic kit for carrying out the method according to claim 34, characterized in that it comprises:

- at least one antibody according to claim 15;
- a medium suitable for forming an immune complex with said antibody;
- reagents allowing the detection of any complexes that are formed;
- control samples, if appropriate.